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THE AGRICULTURAL STATISTICS OF

I N D I A

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INDIA

GLOSSARY OF TERMS

Aman - Rice crop produced in calendar mid-year and harvested in later months of calendar year.

Anna - An Indian coin, equal to 1/16 rupee.

Aus - Rice crop produced in early months of calendar year and harvested in calendar mid-year.

Cadastral Survey - A survey of land with detailed maps showing boundaries of fields, highways, streams, canals, etc., with some details of ownership, tenure, and use (see page 3, paragraph 2). Kept to date in sub-district office registers by recording changes in land ownership, and tenure and also reports of change in field boundaries, received from local tax officials.

Chowkidar - Village headman having duties similar to a constable for a police-station area.

Kharif - Sorghum and other crops produced in calendar mid-year and harvested in later months of calendar year.

Khasra - A register of land ownership and tenure, with accompanying field maps kept to date in the sub-district registry offices (see page 4, paragraph 2).

Maund - An Indian unit of weight equal to 82.28 United States pounds.

Patwari - A village official having duties similar to a town clerk (see page 4, paragraph 2).

Rabi - Sorghum and other crops produced in early months of calendar year and harvested in calendar mid-year.

Rupee - The Indian monetary unit, valued in 1958 at 21 United States cents.

Tehsil - An administrative revenue unit, called also a sub-district, where registry of land is maintained.

Thana - An administrative unit, called also a police station. There are 237 in West Bengal (see page 8, paragraph 2).

Zamindar - An individual who paid taxes of a fixed amount for an area and, in turn, collected taxes from the users of land, (see page 3, paragraph 2).

ORGANO

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Summary. The agricultural statistics of India are coordinated in the Directorate of Economics and Statistics of the Ministry of Agriculture. Since 1947, the year of partition, great progress has been made in developing improvements in comparability of the State estimates in program content and in methodology.

The Directorate has been bringing constant pressure on the States, where the primary work is carried on, to induce the responsible State Agencies to make technological improvements. Thus, in additional States the estimates of area have been improved either by sterner administrative control of the semi-annual identification of crops or by the institution of sampling methods. To facilitate improved area reporting, the Central government has contributed substantially to the cost of cadastral surveys in States which did not have them. At present, Orissa is the only major State for which area in crops is entirely estimated by the traditional subjective methods. Considerable portions of four other States are similarly estimated. In addition, most of Jammu-Kashmir, about one-third of Assam, and scattered areas in other States are so-called "unreported." The Directorate now makes allowances for these incompletenesses, a procedure concerning which we had been in doubt. These allowances are made in the "final" estimates only.

Similarly, the State organizations have been urged to substitute crop cutting for the traditional subjective method of determining yield. At present 15 of the 28 States (pre-reorganization count) base yields upon crop cuttings. These 15 include all of the major States except Rajasthan. The method is followed for the principal food grains and some cash crops.

An important step has been taken by the Directorate in the preparation of revisions of area and production estimates so as to place these on a comparable basis. These series are available in printed form from 1950 to date by States and for all-India. Slight additional revisions have been made but not published. These revised figures are the basis of production indices (base/1949-50) which have been published. Differences seem to be minor.

Part of the estimates of acreage come from a tabulation made by local (village accountant) of crops growing on all fields at three seasons of the year; part is based upon random sample surveys in which the field ^{man}/identifies the crops growing in certain units outlined by a grid superimposed upon

cadastral maps; and a part is based upon reports of Revenue Inspectors in the form of subjective estimates for a village or group of villages.

Yields per acre for principal crops are based upon sample crop cuttings in a considerable portion of the country; for the remainder they represent subjective estimates of the Revenue Inspector for his area. For minor crops throughout India and for some of the important crops in some States, the estimates are also subjective. For these a current condition figure is multiplied by a predetermined normal yield for the unit reported.

The main deficiency in the Indian statistics is in forecasts or other early season estimates. Such early season estimates as are made (largely for GOI use) involve the "eye-estimate" condition reports of local officials applied to a pre-determined normal yield. The Directorate is "experimenting" with various approaches to obtaining preharvest indications of yield, including a fortnightly condition report from a selected group of respondents and reports of travelling inspectors.

The Directorate is under constant compulsion from above to evaluate the progress of crops during the growing season. The data mentioned above combined with intensive study of weather data, judgments of agricultural officials in the States, etc, constitute the basis of "round number" appraisals.

Officials of the Directorate consider the data reported to them by the National Sample Survey as still in the trial stage. To date, the results have not been utilized to any appreciable degree.

Other than the recent Livestock Census, data on livestock consist largely of the results of experimental sample studies designed to develop techniques for determination of milk yields, egg production, etc.

All in all, we may expect continued improvement in the Indian statistics.

Scope of Study. This report is based upon a review of agricultural statistical work made in August and September of 1958. Discussions were held at the Embassy in New Delhi and at the Consulates at Calcutta and Bombay. Interviews were had with the Indian national officials at the Ministry of Food and Agriculture and the Central Statistical Organization at Delhi, the West Bengal Statistical Bureau and the Directorate of Industrial Statistics, the Directorate of Commercial Intelligence and Statistics, a branch of the central government which compiles and publishes information on foreign trade in India, and the Directorate of Agriculture of West Bengal at Calcutta. In Srinagar agricultural matters were discussed with the Deputy Director of Agriculture and Director of the Animal Husbandry Department. In Calcutta I also visited the Indian Statistical Institute which has supervision of the national sample surveys of India. At Bombay conferences were arranged with the officials of the Bombay State Bureau of Economics and Statistics and with the officials of the Indian Central Cotton Committee, a quasi-official agency.

Historical Development. The agricultural statistics of India have been undergoing constant development since partition in 1947. Prior to that time much of the information was gathered by Provincial (State) authorities based upon reports of village accountants called patwari. In some cases the patwari simply made estimates of the total area of various crops and prepared overall estimates of production in the villages. These were passed on through the chain of command to the provincial level and published as such by the provincial governments and incorporated into the overall Indian statistics. In recent years the methods of collection have been systematized by extending the coverage to the various segments of India and improving the methodology both with respect to the collection of information on acreage and yields per acre. As of 1958 all but one important state was using the crop cutting approach in the determination of yield per acre. It was said that State would initiate the crop cutting procedures next year.

Under the British rule a part of India was in the so-called zamindari system of permanent settlement where the British turned over the collection of land taxes to an intermediary called a zamindar. This official paid a fixed sum each year and collected what taxes the traffic would bear or whatever taxes he felt were justified. This system existed in Bengal, Orissa, Bihar, and the inaccessible areas of Assam and Kashmir. The zamindar system did not call for land registers or maps such as existed in the remainder of India where the British continued the direct collection of revenue in the form of land taxes. For this purpose they had developed a cadastral survey and land register in which each piece of land was recorded together with the name of its owner. This record was kept up to date as similar records are kept in the United States today. The system entailed the preparation of detailed maps showing the conformation and area of each field or piece of land. This cadastral survey formed the basis of a very effective system of learning about land use for crops and fallow, etc, for a good many years. It now forms the basis of crop estimating work in India, except in West Bengal where modifications exist.^{1/} The central government of India has assisted the States which had the zamindari system to develop a land register and cadastral survey showing fields by number and area. Prior to partition the princely states, which were not part of the provinces, had their own systems of land revenue. Of the several hundred princely states, however, there were only four that attempted to ascertain the production of crops and the numbers of livestock, etc, in their territory. Since 1947 these princely states have all been absorbed into the larger states surrounding them. The central government has assisted in the preparation of cadastral surveys in Saurashtra, Rajasthan, Andhra Pradesh, Mysore, Madras, and Uttar Pradesh. Previous to partition these areas were under the zamindari system or had large princely states' holdings. A cadastral survey is available for West Bengal, but in that State a complete survey and enumeration was made in 1944-45, which is basic to the sample surveys made annually beginning in 1947-48.

Organization. The crop and livestock estimating work of the Indian Government is carried on in the Directorate of Economics and Statistics of the Ministry of Agriculture. In a sense the Directorate is a coordinating office, since much of the work of gathering data is done in the States, usually by a State Bureau of Economics and Statistics, but in some cases by the State Directorate or Department of Agriculture. Data on acreage originate with the

1/ See pages 6 and 8.

village accountant or patwari, who are the local representatives of the Indian Land Revenue Department.

The Directorate has prepared a number of statements setting forth the extent to which Indian statistics account for the total area and production of the principal crops. There is a very good treatment of this in the November 1957 report of the Foodgrains Enquiry Committee. In this report the situation with respect to the collection of statistics of food crops classify the land in four categories:

- (a) Cadastrally surveyed, and possessing a primary reporting agency (69 percent of the country);
- (b) Cadastrally surveyed but not possessing a primary reporting agency (7 percent);
- (c) Unsurveyed, but possessing a primary reporting agency (13 percent); and,
- (d) Unsurveyed and also without a primary reporting agency (11 percent).

The report points out that statistics in 18.9 percent of the total land area are based on estimation.

The Directorate of Economics and Statistics in 1957 issued a mimeographed "Survey of the Improvements in Agricultural Statistics Since Independence" which describes the present operations. This publication points out the difficulties which had to be overcome in building a consistent and comparable series of statistics since 1947, the date of partition. Differences existed in the various states in the pre-partition days in the manner in which the information was collected or, as previously pointed out, was not collected at all. The supervisory officers of the Revenue Department were not able to devote sufficient time and attention to supervising the work of the patwari because of their manifold duties and in many States District statistical officers now have been appointed to supervise and check the preparation of the source materials. The patwari is the village accountant or official who assesses the land for taxation and reports upon area of crops. The khasra is the important record and it is kept in the village notebook. In it each plot has a number and there is a page for each plot on all of the cadastrally surveyed area. As part of the land revenue work, the village accountant also keeps a record of land ownership. Documents go to the registry in a sub-district or tehsil office. Twice a year the information is brought up to date by inspection for the State Government. In some areas the patwari assists in collecting taxes; in some areas he has nothing to do with it. In Uttar Pradesh for example, there is a separate person who collects the tax, irrigation fees, recovery of loans, etc. He prepares the remission statements where a tax is remitted. In Madras the accountant has one village; in north India he has a circle of four or five villages. The next highest step in the administrative setup is the revenue circle which is in charge of a revenue inspector. Then comes the sub-district and then the districts, of which there are about 318 in all. In 1957 there were 28 States in India. Recently there has been a general consolidation of States down to 14 and 6 Union Territories.

The area and yield information does not originate from the same source. The revenue inspector, not the patwari, conducts the crop cuttings. The eye estimates of yield also come mostly from the revenue inspectors. At the State level the Land Revenue Settlement Officers receive both area and yield figures. Acreage and production estimates using weighted average yields are usually done by an agricultural statistician in the State, either in the Department of Agriculture, the Land Settlement Office, or in a Statistical Bureau. The central office in New Delhi prepares the instructions, but the State Statistician works under the guidance of the National Sample Survey, which has a supervisory staff and inspectors to inspect the work in regard to crop estimation surveys.

Acreage Estimates. It will be noted that at present a considerable portion of India lies in the area in which a complete enumeration is made each year of the crops that occupy the land. In another very substantial percentage, notably in West Bengal, estimates of area are based upon random samples. The balance of India is still covered either by estimates made by the local patwari or is entirely unreported. In the case of the unreported areas, the Directorate makes an allowance in preparing the all-India estimates of crop areas.

In much of India annual identifications are made by the patwari of crops growing on the land. In most of the country, two such surveys are made, one for the Karif crops, the harvest of which comes in the late months of the calendar year, the other the rabi or winter crops harvested 4 to 6 months later. In some States, a third crop is harvested. The patwari compiles a record of the acreages of crops and other uses of land in his village and makes his report to the revenue inspector, who compiles a report for his revenue circle and passes it on to the sub-district official. It then goes to the central office at the Directorate of Economics and Statistics. The Revenue Inspector and the Tehsildar at the sub-district, have the responsibility of supervising and inspecting the work of the officials at the next lower level. This usually takes the form of a duplicated identification of the fields on a randomly selected sample and an inspection of randomly selected tabulations at the revenue circle.

Yield and Production. The estimates of yield per acre traditionally were based upon reports from the local village officials, who estimated the normal yield, which was an average of a number of years and which was revised from time to time. Each year they also estimated yields as a percentage of normal, usually expressed in terms of so many annas to the rupee which the current years crops were of normal.

Over a period of years this method has been replaced in much of India by random sample crop cutting surveys though eye estimates are still in use in limited areas. India did a considerable amount of high quality pioneer work in setting up procedures for the crop cutting surveys. This procedure is now

used for the principal food crops. The Food Grains Enquiry report includes a tabular statement showing the year in which the method of crop cutting surveys was adopted in each State beginning in West Bengal for rice in 1947-48 and then progressively extending over the rest of India except for the State of Orissa. Madras, the latest State to change over from the traditional method, began the use of crop cutting samples in 1955-56.

The objective estimation of yields from crop cuttings relates only to a part of the crops grown in each one of the Indian States. The number of crops covered by the method varies from State to State depending upon the importance of the crop in the State and the facilities which the authorities have for this more costly and painstaking method of acquiring information.

Crop cuttings are made by the Revenue Inspector on a random sample of villages and fields within them. The sample villages are chosen at the State level and random sets of numbers provided for the selection of fields. The size of the cutting varies. In some States it follows the NSS sample size of two concentric cuts with 2'3" radii; in others it is larger and not circular. In all-India, exclusive of West Bengal, cuttings are made on about 45,000 units in the Karif season and 35,000 in the rabi season. Yields are determined on a net basis, i.e., estimated losses from harvesting, winnowing, and drying are deducted from the gross weight of the field sample. The derived yields per acre form the basis of the estimates by States from the principal crops.

For other crops, the traditional system of eye estimates is still used, though additional crops in additional States are being covered by crop cutting methods. The revenue inspector inspects the crop, talks to producers and the patwari and then prepares estimates of yields for the circle and sends these to the tehsildar who weights the yields by area. The information then goes to the District official who weights it and then sends it on to the State. The District officer has authority to review and check the figures. The State statistician sends the yield for the State with the District data on to the Directorate at New Delhi. The revenue inspector prepares his estimate either in pounds per acre or in condition in annas or in percent of normal. The estimated conditions are applied to the normal yields fixed by the State. The New Delhi central office has recommended to the States that they use the 10-year moving averages of crop cutting yields as the basis for the normal yields. Estimate in maunds are made at the State level; in a few States the Districts do it also. Changes are made infrequently upon Federal review and only after the representative of the center goes to the State to discuss the estimates; the final decisions are within the States. The traditional estimates are not used except for states which have no crop cuttings or for crops for which the crop cuttings are not yet adopted.

West Bengal Estimates. In West Bengal the statistics of agricultural production are gathered by the State Statistical Bureau for the Directorate of Agriculture. This has been the situation since 1951-52; prior to that time the Directorate of Agriculture had its own system in which it was helped by the Indian Statistical Institute. The arrangement had its beginning in 1937 when the Directorate asked the ISI to undertake a survey of jute acreage and

production. From 1937 to 1941 the ISI carried on experiments in sample surveys of jute both with respect to acreage and with respect to yields. Crop cuttings were introduced into the yield estimates at that time. Beginning in 1944 the sampling of area of jute, wheat, and rice and other commodities had progressed to the point where it was handled much as the present system in West Bengal. The Indian Statistical Institute made a study of patwari returns in 1949-50 and 1950-51 to evaluate the relationship between the patwari returns and those obtained by the random sample methods.

West Bengal Acreage. The West Bengal State Statistical Bureau uses the village mauza as its first source of information. As a stratum it has adopted the thana or police station which is the smallest administrative unit. Samples are chosen systematically by arraying the mauza serially and then by selecting two units for each square mile of the area, by using random coordinate numbers. This determines the number of units which fall into each thana. The unit is 2.25 acres or about 0.7 percent of the land area in total.

Separate sample fields were selected for each of three years and each sample numbered serially. The samples were then divided into two halves giving them odd and even numbers, - in all six sets of sub-samples. The selection is made in the Calcutta office by superimposing a square grid over the base map for the village at a point selected by the use of random numbers and indicating the location of the grid on the map. A grid plot list and copy of the map is sent to the field worker. In all there are about 56,000 such land units in West Bengal. The total area of West Bengal now is about 21.7 million acres; in 1948 there were about 20 million acres, including hill area, forests, etc., with a net figure of crop land of about 13 million acres. At the time of partition some additional area surrounding West Bengal was brought into the jurisdiction of that State. The Bureau is now making a detailed survey of the added territories since the possession of a base map is part and parcel of the grid system of operation. The patwari or fieldman reports the crops which are being grown on each field at the time that he visits it. In the first six weeks of the survey period he surveys one half of the grids, taking them alternately. He then comes back and makes the crop identifications on the other half of the grids. He can do about three grids a day which is equivalent to about 100 in six weeks and about 200 grids in all.

The village worker's report on acreage is checked by an inspector at random. The inspector does his inspection by making a resurvey of part of the grids. The inspector reports directly to the district officer who is known as an assistant superintendent. A sample is drawn of the surveyed grids and divided into two parts at the ratio of three to one. Three of these are resurveyed by the supervisor and the other one is resurveyed by the assistant superintendent.

The work of making the surveys on crops begins on June 1, at which time the jute and the early, or so-called aus, season for rice is underway. Another survey is taken at the time of the aman crops of the autumn, and then a third survey taken with respect to the winter crops. In this way the work of the local representative of the Bureau is continuous. He spends three months on the aus crops, three months on the aman crops, three months on the winter crops and the fourth quarter on reports and preparation for the next season.

West Bengal Yields. In addition to identifying the crops growing on the various fields the fieldmen are responsible for the crop cutting. The grids for the crop cutting are one half as numerous as those for the acreage counts. They are taken from the so-called B sample which is the second one-half or the evenly numbered fields. The field worker needs to make arrangements with the cultivator of the land to utilize the grid for the crop cutting sample. He takes a cut from each of the crops growing on the grid. The headquarters at Calcutta selects by random numbers the fields from which the cutting will be taken. If there is no rice on the sample selected the fieldman goes on to the next number on the headquarters original list. This is the practice followed for the aus rice and jute and for the aman rice. For the winter crops the fieldman is given a specified number of samples to be taken for each crop such as sugarcane, and potatoes. In every thana 30 percent of the grids are selected at random. The maximum number of cuts fixed for any field worker is 30. He may go outside the grid if necessary to obtain the required number of sample cuts. The size of the cut is a circular area of about 100 square feet, divided into three concentric circles having two foot, four foot and 5.65 foot radii.

The plot from which the cut is made is located by pairs of random numbers supplied to the field worker. He is required to record the actual weight of the product, paddy for example, immediately after a cutting. A number of samples are dried for about 10 days and weighed again in order to determine the shrinkage through curing. In a report on the sample surveys for estimating acreage and yield rates of aman rice in West Bengal in 1955-56, there is a table which shows the extent of this operation. There are 237 thanas. The number of grids which were allotted was 49,675. Involved in the work were 14 supervisors, 40 inspectors and 251 assistant investigators, or fieldmen. There is another table relating to the crop cutting work showing that for the aman work of 1955-56 a total of 3,833 cuts were made. The tehsil is the records unit and center in the West Bengal governmental administrative setup. No centralized agency for the collection of complete data on area has existed at any time in Bengal and it doesn't exist now. In other words, there is no central land records section to which all the records of crop use, utilization and land use would finally be sent. The Directorate of Agriculture of West Bengal has a small statistical section which publishes currently the information on crop acreage and crop production which is obtained for them by the Statistical Bureau. It also issues information which is gathered from agricultural people located around the State with comments on the weather. It publishes 1st and 2nd forecasts of rice production based on condition figures gathered from extension workers.

Bombay Agricultural Statistics. In Bombay, the Statistician of the State Agricultural Department is responsible for collecting agricultural statistics.

. At Bombay I was told of C. D. Deshmukh, a district revenue officer and later Minister of Finance. He began a systematic crop estimation system sometime after 1885 and continued it until 1922, making crop cuttings at representative places in Madyha Pradesh. In 1923 he tried to rationalize the selection; fields were selected on the basis of the distance from the last one. This plan, however, was not repeated. All of the early measurements of samples for rice cuttings were one chain square, i.e., 16.5 x 16.5 feet. In Bombay the sample now is 16.5 x 33 feet for yield per acre. The number of samples depend upon the crop; the objective is to obtain an estimate which approaches 2 percent in precision.

The village official reports the area in each crop based on his field inspection. A saza is a group of villages averaging four in number. Ordinarily one man is responsible for statistics in a saza. For the karif crops the record of area and yield is taken at the time of harvest from October to December. For the rabi crops the samples are taken between February and April just before harvest. The date of the probable harvest is estimated at the time of the visit to select the plots for the crop cuttings.

In Bombay the local patwari report the condition of crops to the Bombay office, but the Bureau does not forward these to Delhi. These are not intended for use in forecasting yield but are used by the State to locate areas of shortage of food, etc. The Ministry of Agriculture uses this material for forecasting and sends the information on to the Directorate of Economics and Statistics at New Delhi.

Summary of Methods.

To summarize, part of the Indian estimates of acreage are based upon enumeration of the crops according to the fields on which grown, made by the local patwari and reported up the line through the land settlement officials until these reach the land records commissioner in the State; a part is still based upon reports of revenue inspectors to State Directorates of Agriculture made upon estimation of the area in the given crops. A third part is based upon sample surveys in which the patwari identified the crops grown on certain sections outlined in the form of a grid superimposed upon a map of the area and reports it through channels to the State Statistical Bureau.

Yields per acre are based upon sample crop cuttings in a considerable proportion of the country but reliance is still placed upon the local patwari in one important state (Orissa) and in fragmentary parts of other states. The crop cuttings, however, do not cover all crops but are restricted to the principal crops. The estimates of the other minor crops therefore are still based upon the traditional method of setting up a normal yield and multiplying by a current condition percentage.

Forecasts and Early Estimates. First estimates of crops in India take the form of reports on acreage sown which are based upon reports for comparable units in the States. For example, the first report on all-India rice from the 1957 crop was issued on January 6, 1958. It reported 68,011,000 acres as being about 90 percent of the total. The second estimate released on February 17, 1958 reported 73,280,000 acres, equal to about 95 percent of the total. The third and fourth estimates includes statements of probable production based upon early yield estimates. In 1957, 68 forecasts for 26 crops were scheduled for release. The crops covered are listed below:

Rice	Gram	Tobacco	Linseed
Jowar	Tur	Ginger (dry)	Cotton
Bajra	Other Karif Pulses	Pepper (black)	Jute
Maize	Other Rabi Pulses	Chillies (dry)	Mesta
Ragi	Potatoes	Castorseed	Small Millets
Wheat	Sugarcane	Sesamum	
Barley	Groundnut	Rape & Mustard	

Ad hoc estimates are also available on the following:

Cocoanut	Tumeric
Bananas	Opium
Tapioca	Lac
Sann-hemp	
Papaya	
Sweet Potatoes	

Forecasts, when made, are still based upon the traditional method of reporting in which the Revenue Inspector reports a condition in relation to a normal yield. The derived condition is multiplied by the pre-determined normal yield to obtain the forecast of yield per acre.

Non-official crop reporters report fortnightly and are located in the villages. These are qualitative statements and not quantitative. Every tenth day and now weekly these are summarized in the State Directors of Agriculture offices. Information is also received from tour reports of traveling officials in the revenue organization, etc.

Some information is collected by officials of the Directorate of Economics and Statistics, who do some travel in the major districts, sub-districts and major crop-assembly markets. These employees plan to tour three weeks out and one week in the central office. Marketing intelligence is being combined with the production information. The officials go to the markets and talk to farmers, dealers and other elements in the trade. In addition to condition and prospect, they report on the pace of the market arrivals, the direction of the flow, the stocks, prices, market sentiment, illegal practices, etc.

Mail inquiries are being started using a small card approximately 3 x 5 inches for a fortnightly crop report for reporting of the principal crops. The first items covered by checklist of sowing, germinating, transplanting, standing and harvesting as a stage of crop growth. Next blanks for estimates of the areas under the crops compared to last year as being more, the same, or less, than the condition of the crop, better, the same, or worse and the percentage in each case. This card is sent post-free to the Directorate of Economics and Statistics at Delhi and is used by officials there in making the frequent estimates of crop production which they need for the Minister's use in policy decisions, etc. The Directorate of Economics and Statistics, however, supplements this approach in preparing production estimates during the growing season. General information obtained from well informed persons in the States, is utilized to calculate approximations of the final outturn. The information takes the form of estimates of change from the preceding estimate, change from the previous year, and influences upon yield by drought, flood, etc.

Livestock. Information on livestock numbers has been confined to the quinquennial censuses. Before 1947 these were made by the State authorities and were not made at the same time throughout India and did not have uniform inquiries. In 1951, under the Directorate of Economics and Statistics, country-wide schedules and instructions were used and the census was greatly improved in coverage and comparability. Further improvements were made in 1956 and the census was taken on a household basis. A check survey was made in 1956 by the NSS to determine the precision of the census.

No nationwide data are collected on livestock products. Some pilot studies have been made which were designed to develop methods for collection of such information.

Training. Great stress has been placed upon the training of personnel at all levels to improve the quality of the agricultural statistics. This takes the form of (1) intensive training at New Delhi of officers from the States who are concerned with the supervision of the State activities, and (2) shorter courses for the collecting and supervising officers down to the village level. This training is conducted at the State, District and Tehsil level. It was said that upward of 60,000 employees had received training by the end of 1957.

Processing Statistics. There are two activities covering all of India which are carried on at Calcutta and which have a bearing upon agricultural production. The first of these is that relating to the statistics of Indian manufactures carried out in the Directorate of Industrial Statistics located in Calcutta. This agency makes an annual census of all manufacturing, including the processing of agricultural products. The agency recently published a summary of ten years from 1946 to 1955. Included in the summary are such items as the manufacture of wheat flour, rice milling, fruit and vegetable processing, sugar refining, production of spirits and beer, production of starch, oilseed crushing, extraction and processing of vegetable oils, production of jute, cotton and woolen textiles and leather tanning. Inquiries are sent by mail to all firms employing 20 or more workers on any day and using power. Follow-ups are sent and in some cases a personal visitation is made to firms which fail to report.

Included in the information are the quantities of raw materials used together with their values, and the production of the processed commodities with their values. The information contained in this census is probably the best source of data for some of the agricultural commodities that need to be processed before they can be shipped or transported for consumption.

Foreign Trade. The other national project carried on in Calcutta relates to the foreign trade of India. This information is collected by the Directorate of Commercial Intelligence and Statistics. Recently the agency experienced considerable delay in releasing its report because of changing over from manual record keeping to the use of I.B.M. cards. On July 23 the Director had at hand figures up to June 15 which, he said, were available to anyone who wanted them. The March-April report was already in press and May was ready to go to press. A daily register is maintained of information received from reports so that by the 10th of each month the totals of the preceding month will be available for anyone who asks for them. The publication, however, would not appear until sometime during the succeeding month 1/.

Jute Statistics. The Indian Central Jute Committee, a central government agency, is located in Calcutta.

1] The Secretary of the agency reported that jute production was mostly on small units averaging about one acre of jute. There are about one and a half million such producers who sell the product at the door or to travelling dealers. Dealers sell the jute to a secondary market where there are larger dealers and balers and stockists. Bales are of two kinds, (1) loose pack that goes to Calcutta, and (2) a paca bale which goes for export through sorting and baling houses in Calcutta which prepare the jute for the mills at that city. The Jute Committee issues data on markets and has a field staff to collect information on the cost of production, cost of living of the jute workers and other special studies. The committee financed the crop area and crop cutting work done by the Indian Statistical Institute until the State of West Bengal took it over. 1/

Indian Statistical Institute. The Indian Statistical Institute is a private organization which at the present time does considerable work for the Indian government under contract or similar financial arrangements. One of its first undertakings was the survey of jute acreage and production in 1937. At that time a beginning was made in random sample surveys of area and in random crop cutting samples of yield. The Institute has increased in size and at present is located some distance from the center of Calcutta housed in a number of buildings which have been erected from time to time as the organization expanded. The Institute did some agricultural area estimating and production estimating for the West Bengal Bureau of Statistics. At the present time the Institute, among its projects, carries on the National Sample Survey. Included among the subject matter of the N.S.S. is some work on agricultural production. The Institute's present function in connection with the N.S.S. is that of responsibility for the technical phases of the work. The actual enumeration of information, the actual crop cutting and measurements of acreage and so on, and surveys on other subjects are carried on by the N.S.S. staff who have their

- 1/ The Indian Jute Mills Association gathers statistics of jute processing from its members and publishes them monthly
- 2/ FAS finds foreign trade reports to be incomplete when checked against trading partners records of exports.

headquarters at New Delhi as part of the Central Statistical organization. The Institute also is responsible for the tabulation and analysis of the result of these surveys. Illustrations of the type of work done follow: For 1953-54 the N.S.S. conducted surveys in 4,000 villages. In each village a sample was taken of 20 households to get a pattern of the size of the farm holdings, both ownership and operation. The results were published in their monthly publication "Sahkhyा". The Institute also took a verification sample of the livestock census in 1956-57.

The Institute conducts two surveys annually as a check on the area and production of crops taking in all India about 6,000 samples. It has a crop survey section which came to it by transfer from the Indian Council of Agricultural Research. In this group there are about 60 persons available for checking. These employees work from 5 regional offices. Information is obtained on rice, jowar, bajra, ragi, maize, wheat, barley and gran. The design of sample calls for 100 experiments per worker, two per village in 50 villages. The 50 villages are stratified by tehsils (there are about 2,000 villages per district). The N.S.S. has 500 field workers of its own who do crop cutting on a small scale. The results are tabulated at Calcutta. They do a survey of crop acreage in about 2,000 villages and crop cutting in one half of the villages. In other words, the sample on crop cutting for all of India consists of cuttings made in 1,000 villages.

Indian Central Cotton Committee. This committee is housed in Bombay. It consists of representatives of all phases of the cotton industry. The secretaryship is rotated. Dr. Sethi, the present secretary, has been there over two years and will be replaced by another technician at the end of five years. He is an Indian civil servant and was previously Director of Agriculture in Madhya Pradesh. The committee is a quasi-governmental organization receiving support from a tax on cotton ginnings of four annas per bale and an additional tax on cotton exports of four annas per bale. Membership is composed of growers, including the big growers and cooperatives, ginners, spinners, weavers, heads of State Directorates of Agriculture, and the Secretary of the Ministry of Agriculture, who is chairman of the meetings. The committee utilizes the income which it receives from the tax on cotton ginnings and exports to finance research on cotton throughout India. The committee reviews projects which are submitted by State Agencies, by Regional experiment stations and by the all-India experiment stations. It makes allocations of funds according to established policies. Dr. Sethi said that the projects were set up on the basis of staffing cost and contingency cost. The committee contributes to whichever is the lower of the two. Usually the contribution is on a sliding scale. For example, sometimes it is as much as 100 percent in the first year, 75 in the second, 50 percent, etc., usually for a five year period. Regional work is largely on fundamental research and it may be entirely supported by committee allotment. The projects vary from variety selections to textile research.

The central office at Bombay collects and publishes statistical and economic information about cotton. The final figures put out after several years are based on ginnings, plus changes in stocks, plus unginned cotton used in the mills, plus net exports of loose cotton, plus estimates of extra-factory consumption.

The only statistics which the agency itself gathers are those which have to do with ginnings and exports. These are in the nature of administrative statistics since each ginner is required to report upon and pay the tax on cotton which he gins and each exporter is required to report upon and pay the tax on cotton which he exports. A considerable number of statistical series, including statistics on prices, are published, but these come from other sources. The periodical gives estimates of Indian cotton production as supplied by trade sources. It also includes information put out by the Ministry of Agriculture. The observation was made that the trade estimates usually are on a higher level than the final figures as obtained from the utilization studies outlined above whereas the Ministry of Agriculture's forecasts generally tend to be too low. The final India figures are a compromise close to the balance sheet figures which are put together by the central office. These are checked with the trade interests and also with the Directorate of Economics and Statistics of the Ministry of Agriculture at New Delhi.

In the world crop production summaries, which it issues, the Committee uses the figures of the International Cotton Advisory Committee for all countries except India.

Publication. The agricultural statistics of India appear first as mimeographed Forecasts or estimates for individual crops and in the monthly Journal of Agricultural Situation in India. Reviews of crop acreage, production, and distribution appear as commodity reports with such titles as "Cotton in India". An important review is that relating to the Food Situation in India. The several States publish season and crop reports, which bring together data on production, land utilization, agricultural prices, etc. The Directorate of Economics and Statistics reviews the area and production data in its annual "Estimates of Area and Production of Principal Crops."

Comments. The Directorate of Economics and Statistics, from all evidence, has made material progress in bringing about a fully consolidated program of adherence to its high standards of technology by the States, each of which has had a program and methodology of its own. The Directorate has thoroughly studied and appraised the statistics since partition in 1947 and has come forward with a series of crop estimates from 1949 to date, which satisfies most users of agricultural statistics as reflecting very well the developments in agricultural output since that date. It is my judgment that comparability in the series has been accomplished to a major degree.

My query whether the revisions involved adjustment of yields from the traditional subjective level to the crop cutting level brought a negative answer; it was said that the differences were not always in the same direction and varied in degree. I plotted State figures for the principal crops, however, and found some evidence of shifts of yield levels which coincided with the year of introduction of crop cutting. I did not feel, however, that further adjustments in these instances would show any difference in trend in the all-India series since 1949.

The Directorate evidenced its determination to improve the quality of its agricultural statistics when it organized and carried out its massive training program. The results have justified the effort.

The delay in publication of early estimates of Indian crop production constitutes a series gap in the country's program of self-appraisal and is a serious drawback to obtaining an early world picture of agricultural developments, since Indian production is a material percentage of world output for rice and to a lesser extent for other crops. Much remains to be done, and is possible in this phase of the agricultural statistical program of that country.

The use of a predetermined normal yield multiplied by a current condition figure offers little hope of success; the process is akin to the "par system" used in the United States until about 1923 and discontinued at that time in favor of the visual correlation method, which recognizes the curved relationship of reported condition to yield per acre. The increasing use of crop cuttings in determining yield per acre has been an essential first step in the direction of setting up a basis for early forecasts from correlation with subjective reports of condition. The shift to inquiries regarding yield per acre at harvest time (in lieu of condition X normal yield) also constitutes an improvement, particularly if reported yields are checked as to proper levels by crop cutting experiments. The staff at the center realizes that during the growing season only a small number of judgment returns of condition is required to provide a useable figure for correlating with yield per acre.

Earlier estimates of acreage sown might be possible by a random sampling of village acreage reports of sufficient size to provide an approximation of change from the preceding year. It is obvious that such a change in procedure will require careful synchronization in view of the multiple cropping of land which exists in India. An important administrative problem exists also in the relatively autonomous authority of the States in this field. Such early information on acreage should be very useful to the Ministry of Agriculture in setting goals for food procurement.

Livestock reporting continues to lag in India. The present program of livestock statistics is inadequate. In the summary statement of the Directorate program for further improvement of agricultural statistics, livestock statistics are not even mentioned. This may be an oversight, inasmuch as the Directorate officials are conscious of the importance of livestock statistics, as stated on page 11, an improved livestock census was taken in 1956 and a concurrent sample taken by the NSS. For the 1961 census, an enlarged scope is proposed. Efforts are also being made to begin the collection of data on livestock products.





